

CLAIMS

1. A shifting apparatus for a multistage transmission, in particular for a motor vehicle, whereby in the transmission at least two, non-successively following ratio stages are assigned to one shifting packet, therein characterized, in that at gear shift lever for the activating of the shifting packet is provided, and in that a shifting pattern is made available to the gear shift lever, wherein essentially, the shifting position of each two successively following gears lie opposite to one another and in that the gears which can be selected within the pattern paths are assigned to different shifting packets.

2. A shifting apparatus in accord with Claim 1, therein characterized, in that, between the gear shift lever (4) and the at least one shifting packet (2) a conversion apparatus (8) is provided, which converts a motion of the gearshift lever (4) into a motion of a shifting-means, which achieves one of the stage(3) corresponding to the shifted gear.

3. A shifting apparatus in accord with Claim 1 or 2, therein characterized, in that, the conversion apparatus (8) is designed as a direct or as an indirect connection between the gear shift lever (4) and the at least one shifting packet (2).

4. A shifting apparatus in accord with Claim 1, 2, or 3, therein characterized, in that the conversion apparatus (8) is designed as a mechanical, hydraulic or pneumatic connection, or as a combination of at least two of the connections.

5. A shifting apparatus in accord with Claim 1, 2, 3 or 4, therein characterized, in that the conversion apparatus (8) is designed as shifting rods or as cable/metal rope or as a combination of two thereof.

6. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that a shifting pattern (6) is assigned to the gear shift lever (4), which is designed with an H or multiple H patterns, wherein, in shifting positions, neighboring ratio stages essentially lie opposite to one another.

7. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that within one shifting path (5) successively following ratio stages

of the transmission (1) can be shifted by the gear shift lever (4), whereby at least one of the ratio stages (3) can be shifted to by means of a shifting packet (2), to which two non-successively following stages (3) are assigned.

8. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that each shifting path (5) has been assigned at least two shifting packets (2).

9. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that upon the sliding movement of the gear shift lever (4) in at least one selective path (7) of the shifting pattern (6) at least two shifting packets (2) can be simultaneously bound together with the gear shift lever (4) by the shifting-means (9).

10. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that the conversion apparatus contains an inversion apparatus, by means of which, a shifting movement in a shifting path of the gear shift lever produces a movement in the same sense in a shifting-means.

11. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that the gear shift lever (4) is connected with a shifting finger shaft (11) and this said shaft is made axially slidable and radially pivotal by means of the gear shift lever (4).

12. A shifting apparatus in accord with claim 10 or 11, therein characterized, in that to the shifting finger shaft (11) at least one additional shifting finger shaft (12) is coupled.

13. A shifting apparatus in accord with claim 12, therein characterized, in that the coupling of the shift finger shafts (11, 12) is accomplished by means of gears which are affixed to the shafts.

14. A shifting apparatus in accord with claim 12 or 13, therein characterized, in that the placement of the shifting finger shafts (11, 12) is done in one or more planes.

15. A shifting apparatus in accord with one of the claims 10 to 14, therein characterized, in that shifting finger shafts (11, 12) are so coupled together, that one selective positioning of the gear shift lever (4) slidingly pushes all shifting

finger shafts (11, 12) in parallel and/or a shifting motion of the gear shift lever (4) turns neighboring shifting finger shafts (11, 12) in counter rotation (inverse) to one another.

16. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that each shifting finger shaft (11, 12) is assigned to at least one shifting finger (13).

17. A shifting apparatus in accord with claim 16, therein characterized, in that in at least one shifting path (5) at least two shifting fingers (13) of different shifting finger shafts (11, 12) engage in different shifting rods (10).

18. A shifting apparatus in accord with claim 16, therein characterized, in that in at least one shifting path (5) at least two shifting fingers (13) of the same shifting finger shaft (11, 12) engage in different shifting rods (10).

19. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that upon the turning of the shifting finger shaft (11) in one rotational direction, at least one shifting finger (13) of the one shifting finger shaft (11, 12) is brought out of engagement with the one shifting rod (10), and at least one other shifting finger (13) of the other shifting finger shaft (12, 11) slidably displaces the other shifting rod (10).

20. A shifting apparatus in accord with claim 19, therein characterized, in that upon the turning of the shifting finger shaft (11) in the reverse/inverse rotational direction, at least one shifting finger (13) of the other shifting finger shaft (12, 11) is brought out of engagement with the other shifting rod (10) and at least one shifting finger (13) of the other shifting finger shaft (11, 12) slidably pushes the one shifting rod (10).

21. A shifting apparatus in accord with one of the claims 1 to 18, therein characterized, in that upon the turning of the shifting finger shaft (11) in one rotational direction, at least one shifting finger (13) of the one shifting finger shaft (11, 12) is brought out of engagement with the one shifting rod (10) and at least one other shifting finger (13) of the same shifting finger shaft (11, 12) slidably displaces the other shifting rod (10).

22. A shifting apparatus in accord with one of the claims 1 to 18, therein characterized, in that upon a turning of the shifting finger shaft (11) in both rotational directions, at least one shifting finger (13) of one shifting finger shaft (11, 12) slidingly pushes a shifting rod (10).

23. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that the contours of the shifting rods (10) are designed in such a manner, that by means of the shifting finger (13), the shifting rods (10) can be shifted into either a shifting position or into a neutral position.

24. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that the contour of the shifting finger (13) is designed in a manner so that by means of the contour, the torque ratio can be achieved.

25. A shifting apparatus in accord with one of the claims 1 to 10, therein characterized, in that for the transmission of the movement of the gear shifting lever (4) on the shifting pattern (9), at least one toothed segment (14) and at least one rack (15) are provided.

26. A shifting apparatus in accord with one of the claims 1 to 9, therein characterized, in that upon the sliding displacement of the gear shift lever (4) in a selection path (7) of the shifting pattern (6), at least two shifting packets (2) can accept loading by means of the shifting extensions which are bound to the shifting packets.

27. A shifting apparatus in accord with one of the claims 1 to 11, therein characterized, in that the inversion apparatus consists of essentially a shifting finger shaft (311) and a plurality of shifting rods (310), whereby the shifting finger shaft (311) is placed essentially at right angles to the shifting rods (310).

28. A shifting apparatus in accord with claim 27, therein characterized, in that the shifting rods (310) are placed in essentially two planes on oppositely disposed sides of the shifting finger shafts (311).

29. A shifting apparatus in accord with claim 27 or 28, therein characterized, in that on the shifting finger shaft (311), shift fingers (313) are provided which coact with shifting grooves (327) in the shifting rods (310).

30. A shifting apparatus in accord with claim 11, therein characterized, in that the gear shift lever is rigidly bound to the shifting finger shaft (311).

31. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that the shifting finger (313) is placed on the shift finger shaft (311) in such a manner, so that the shifting finger (313), when in the neutral position, does not run perpendicular to the shifting rods (310).

32. A shifting apparatus in accord with claim 31, therein characterized, in that for the achieving of a gear by the activation of the shifting lever, the concerned shifting finger (313) is pivotally placed in a position, which is essentially perpendicular to the shifting rod (310).

33. A shifting apparatus in accord with claim 31 or 32, therein characterized, in that the concerned shifting finger (313) upon pivoting in one direction, activates the shifting rod (310), that is to say, activates the shifting packet and upon the pivoting of the shifting finger (313) in the opposite rotational direction the shifting finger (313) becomes free and the shifting rod (310) is not activated, whereby the shifting rod (310) is kinematically coupled with the shifting finger (313), until the neutral position is once again reached.

34. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that a shifting finger (313) is provided for the engagement and de-engagement of a gear.

35. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that a shifting finger (313) is provided for the activation of a shifting packet, that is to say, for the engagement and de-engagement of two gears, which allows, for example, four gears may be shifted by means of two shifting fingers (313).

36. A shifting apparatus in accord with one of the foregoing claims, therein characterized, in that the conversion apparatus contains, instead of slidable shifting rods, fixed shifting rods, upon which slidable shifting collars are slidingly affixed.

37. A shifting apparatus in accord with one of the claims 1 to 36, therein characterized, in that the shifting apparatus is designed to be hand controlled and/or free from control means.

38. A motor vehicle transmission, therein characterized, in that it contains a shifting apparatus in accord with one of the claims 1 to 37.

39. A motor vehicle transmission in accordance with claim 38, therein characterized, in the it contains a double clutch gear train with only one startup clutch (22).

40. A motor vehicle transmission in accord with claims 38 or 39, therein characterized, in that it is designed as a heavy duty truck transmission.

41. A motor vehicle transmission in accord with claims 38, 39 or 40, therein characterized, in that is designed as a group-transmission.

42. A motor vehicle transmission in accord with one of the claims 38 to 41, therein characterized, in that the transmission is to be manually shifted.